

Burke

I CLAIM:

1. A method for mounting a protuberant conductive contact to an electronic component, the method comprising sequential steps of:

4 providing a wire having a continuous feed end,
5 intimately bonding the feed end to the component,
6 forming from the bonded feed end a stem which protrudes
7 from the component and has a first stem end thereat,
8 severing the stem at a second stem end to define a
9 skeleton,
10 depositing a conductive material to envelope the skeleton
11 and adjacent surface of the component.

1 2. The method as claimed in Claim 1, and immediately before the
2 severing step intimately bonding the second stem end to the
3 component.

1 3. A method for mounting a protuberant conductive contact to an
2 electronic component, the method comprising sequential steps
3 of:

4 providing a wire having a continuous feed end,
5 intimately bonding the feed end to the component,
6 forming from the bonded feed end a stem which protrudes
7 from the component and has a first stem end thereat,

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9 severing the stem at a second stem end to define a
10 skeleton,
11 depositing a conductive material to jacket the skeleton
and adjacent surface of the component.

1 4. The method as claimed in Claim 1, and immediately after the
2 severing step, continuing sequentially the bonding step and
3 the forming step and the severing step for a predetermined
4 number of stems to comprise the skeleton.

5 5. The method as claimed in Claim 4, and immediately before each
6 of the severing steps each of the second stem ends is inti-
7 mately bonded to the component.

1 6. A method for mounting a protuberant conductive contact to a
2 conductive terminal on an electronic component, the method
3 comprising sequential steps of:

4 providing a wire having a continuous feed end,

5 intimately bonding the feed end to the terminal,

6 forming from the feed end a stem which protrudes from the
7 terminal and has a first stem end thereat,

8 severing the stem at a second stem end to define a
9 skeleton,

10 depositing a conductive material to envelop the skeleton
11 and adjacent surface of the terminal.

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- 1 7. The method as claimed in Claim 6, and immediately before the
- 2 severing step intimately bonding the second stem end to the
- 3 terminal.
- 1 8. The method as claimed in Claim 6, and immediately after the
- 2 severing step, continuing sequentially the bonding step and
- 3 the forming step and the severing step for a predetermined
- 4 number of stems to comprise the skeleton.
- 1 9. The method as claimed in Claim 8, and immediately before each
- 2 of the severing steps each of the second stem ends is inti-
- 3 mately bonded to the terminal.
- 1 10. A method for mounting a protuberant conductive contact to a
- 2 conductive terminal on an electronic component, the method
- 3 comprising sequential steps of:
 - 4 providing a wire having a continuous feed end,
 - 5 intimately bonding the feed end to the terminal,
 - 6 forming from the bonded feed end a stem which protrudes
 - 7 from the terminal and has a first stem end thereat,
 - 8 severing the stem at a second stem end to define a
 - 9 skeleton,
 - 10 depositing a conductive material to jacket the skeleton
 - 11 and adjacent surface of the terminal.

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- 1 11. The method as claimed in Claim 10, and immediately before the
2 severing step intimately bonding the second stem end to the
3 terminal.
- 1 12. The method as claimed in Claim 10, and immediately after the
2 last mentioned severing step continuing sequentially the
3 bonding step and the forming step and the severing step for a
4 predetermined number of stems to comprise the skeleton.
- 1 13. The method as claimed in Claim 12, and immediately before each
2 of the severing steps each of the second ends is intimately
3 bonded to the terminal.
- 1 14. A method for mounting a protuberant conductive contact to a
2 conductive terminal on an electronic component, the method
3 comprising sequential steps of:
4 providing a wire having a continuous feed end,
5 intimately bonding the feed end to the terminal,
6 forming from the bonded feed end a stem which protrudes
7 from the terminal and has a first stem end thereat,
8 intimately bonding a second stem end to the terminal,
9 sequentially continuing the forming step and the bonding
10 step for a predetermined number of times,
11 after the last bonding step severing the stem to define
12 a skeleton,

13 *Surfa' ch*
14 depositing a conductive material to envelop the skeleton
 and adjacent surface of the terminal.

1 15. A method for mounting a protuberant conductive contact to a
2 conductive terminal on an electronic component, the method
3 comprising sequential steps of:

4 providing a wire having a continuous feed end,

5 intimately bonding the feed end to the terminal,

6 forming from the bonded feed end a stem which protrudes
7 from the terminal and has a first stem end thereat,

8 bonding a second stem end to a sacrificial member mounted
9 in spaced relationship from the component,

10 severing the stem at the second stem end to define a
11 skeleton,

12 depositing a conductive material to envelop the skeleton
13 and at least adjacent surface of the component,

14 eliminating the sacrificial member.

1 16. The method as claimed in Claim 15, wherein during the elimi-
2 nating step the second stem ends are severed from the sacri-
3 ficial member.

1 17. The method as claimed in Claim 6, 7, 8, 9, 14 or 15, performed
2 on a plurality of the terminals on the electronic component.

extra claims

1 18. The method as claimed in Claim 17, performed on a plurality of
2 wires on a plurality of the terminals on the electronic
3 component.

1 19. The method as claimed in Claim 17, with the bonding performed
2 by applying at least one of a group consisting of superambient
3 pressure, superambient temperature and ultrasonic energy.

1 20. The method as claimed in Claim 17, wherein the severing is
2 performed by melting the wire.

1 21. The method as claimed in Claim 17, wherein the forming steps
2 and the severing steps are performed by a wirebonding appara-
3 tus, and after the severing steps but before the depositing
4 step shaping the skeleton by means of a tool external to the
5 apparatus.

1 22. The method as claimed in Claim 17, wherein the severing of the
2 second ends is performed by mechanical shearing.

1 23. The method as claimed in Claim 17, wherein during the forming
2 step the shape of the stems is determined by means of a
3 software algorithm in a control system of an automated
4 wirebonding apparatus.

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2 24. The method as claimed in Claim 6, 7, 8, 9 or 15, performed on
3 a plurality of the terminals, wherein shape of the skeleton
4 and mechanical properties of the conductive material are
5 organized collectively to impart resilience to the protuberant
conductive contact.

1 25. The method as claimed in Claim 24, wherein the conductive
2 material is provided with a multitude of microprotrusions on
3 its surface.

4 26. The method as claimed in Claim 17, with the depositing step
5 including placement of a plurality of layers each differing
6 from one another.

1 27. The method as claimed in Claim 24, wherein the depositing step
2 includes placement of a plurality of layers each differing
3 from one another.

1 28. The method as claimed in Claim 27, wherein at least one of the
2 layers comprising conductive material has a jagged topography
3 in order to reduce contact resistance of the protuberant
4 conductive contact when mated to a matching terminal.

1 29. The method as claimed in Claim 17 or 24, wherein the
2 deposition is performed by means of electrochemical plating in
3 an ionic solution.

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2 30. The method as claimed in Claim 6 or 8, performed on a pluraliti-

2 ty of the terminals and, wherein:

3 the forming steps result in a plurality of free-standing
4 protuberant stems,

5 the severing steps are performed on the respective stems
6 all in a common plane.

1 31. The method as claimed in Claim 6 or 8, performed on a
2 plurality of the terminals on at least one electronic
3 component and, wherein:

4 the terminals are in different planes,

5 the forming steps result in a plurality of free-standing
6 protuberant stems,

7 the severing steps are performed on the respective stems
8 all in a common plane.

1 32. The method as claimed in Claim 6 or 8, performed on a
2 plurality of the terminals on at least one electronic
3 component, wherein shapes of the skeleton and mechanical
4 properties of the conductive material are organized
5 collectively to impart resilience to the protuberant
6 conductive contacts, and the severing steps are performed on
7 the stems all in a common plane.

1 33. The method as claimed in Claim 17 or 24, wherein the cross-
2 sectional area of the wire is rectangular.

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1 34. The method as claimed in Claim 26 or 27, wherein the wire is
2 made of a metal selected from a group consisting of gold,
3 silver, beryllium, copper, aluminum, rhodium, ruthenium,
4 palladium, platinum, cadmium, tin, lead, indium, antimony,
5 phosphorous, boron, nickel, magnesium and alloys thereof, and
6 wherein at least one of the layers of the conductive material
7 is a metal selected from a group consisting of nickel,
8 phosphorous, boron, cobalt, iron, chromium, copper, zinc,
9 tungsten, tin, lead, bismuth, indium, cadmium, antimony, gold,
10 silver, rhodium, palladium, platinum, ruthenium and alloys
11 thereof.

1 35. The method as claimed in Claim 6, 7, 8, or 14, performed on at
2 least one terminal on an electronic component, wherein the
3 wire is made primarily of a metal selected from a group
4 consisting of gold, copper, aluminum, silver, lead, tin,
5 indium and alloys thereof; the skeleton is coated with a first
6 layer of the conductive material selected from a group
7 consisting of nickel, cobalt, boron, phosphorous, copper,
8 tungsten, titanium, chromium, and alloys thereof; a top layer
9 of the conductive material is solder selected from a group
10 consisting of lead, tin, indium, bismuth, antimony, gold,
11 silver, cadmium and alloys thereof.

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1 36. The method as claimed in Claim 26 or 27, wherein a layer
2 reactive with material of the wire is interposed between the
3 skeleton and the conductive material.

1 37. The method as claimed in Claim 26 or 27, wherein the wire is
2 gold and the reactive layer is tin.

1 38. An electronic component a first and a second surface in which
2 on at least one of the surfaces is provided a plurality of the
3 terminals having protuberant conductive contacts mounted
4 thereto and made by means of the method as claimed in any of
5 Claims 6, 7, 8, 14, 15 or 34.

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